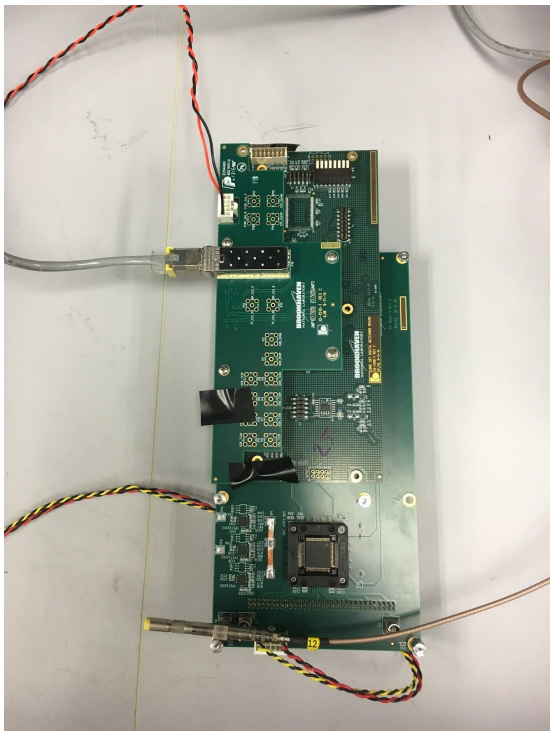
How to setup the test stand



1. Make sure the low voltage power supply is plugged into the ADC board and the mezzanine board.

2. Make sure the LEMO cable from CH1 of the waveform generator is plugged the U4 LEMO connector on the ADC board.

3. Make sure the ethernet from the board is plugged into the back of the computer.

4. The board should look like the picture to the right.

5. Turn on low voltage power supply.
    a. The voltage for both ADC and mezzanine boards should be set at 5V.

6. Turn on the LV output.
    a. The combined current draw should be 1.18 A when the teststand is first powered on.

7. Log into computer as user "*jack*" and open terminal.

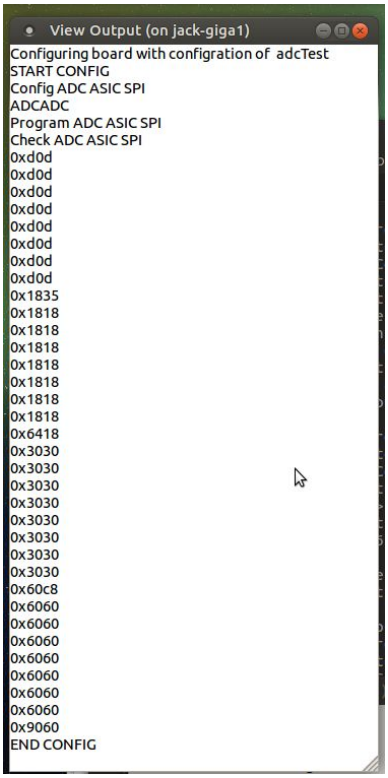
8. cd ~/workshop/femb_udp

9. Type in the command line: **python init_femb.py adcTest**

10. The output of this script will print to the terminal. It should look something similar to the image to the right.

11. Now look at the combined current draw. It should have increased to 1.24A if the ADC testboard configured properly.

12. **You are now ready to do some testing**.



Live Feed Viewing

1. In command line type: **python live_feed_gui.py**

2. A window labeled "*Config window*" will open. This will have a drop down menu where you can choose the board configuration you would like.

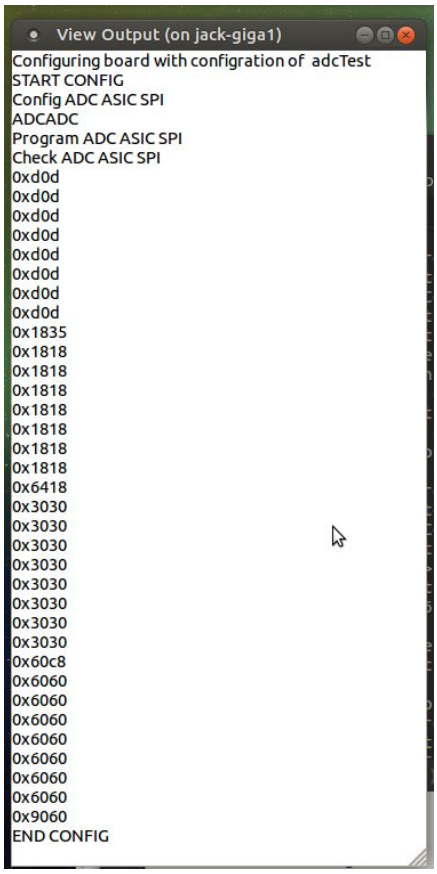
3. You should choose "*adcTest*" as the configuration. This GUI also works with a "*35t*" configuration.

4. Once you have chosen the correct configuration, click "*Board Config*".

5. A new window called "*Live Feed*" will open.

6. After this you will need to look at the "*Config Window"* and click the button that says "*Init Board*". This will initialize the board with the correct configuration.

7. An additional window called "*View Output*" will pop up and tell you what configuration you picked and show the output after configuring the board. A "normal" output should look something like the image to the right.



8. The "*Live Feed"* window will have a "*Plot Data*" button and a "*Plot FFT*" button in the left column. The default channel if you click either button is set to 0.

9. To look at the plot of a specific channel's waveform you have to choose the channel number from the drop down menu in the right column. The ASIC value of 0 is the only option. Once you have done this click "*Select Channel*". This will pop up another output window to confirm the channel you selected.

10. Once you click "*Select Channel*", you can now go and click "*Plot Data*" or "*Plot FFT*" to view the live feed of this channel. The plots will run continuously until you click 'X' to close the window. Until you hit 'X' you cannot select any other buttons from within the GUI.

Exercise

a. *Select CH1 on the waveform generator*
b. *If prompted: to get local control click **Burst***
c. *Choose the following setup: Sine Wave, frequency: 100 kHz, amplitude: 100 mV peak to peak centered at 0.*
d. *Select channel 0 from the "Live Feed" window*
e. *Click "Plot Data"*
f. *Turn on output on signal generator and view the plots*
g. *Turn off output*
h. *Click 'X' on the plotting window*
i. *Click "Plot FFT"*
j. *Turn on output on the signal generator and view the plots*
k. *Cycle through different frequencies from 100kHz to 1 MHz*
l. *Turn off output*
m. *Do NOT turn off waveform generator*

11. Once you are done you can just click "X" on one of the two main windows to close out the GUI.

Python Exercises

1. Add a feature to the GUI to close each live window with the next keystroke.

2. Add a feature to the Plot FFT window to fix the y-axis.

ADC Pulser Test

1. Create a directory to hold the data: mkdir data

2. In command line type **python adc_test_gui.py**

3. A window called "*Config Window*" will open where you have two buttons. One button is labeled "*Board Config*".

4. Click "*Board Config*" to choose "*adcTest*" as the configuration. This is the only possible configuration for this GUI.

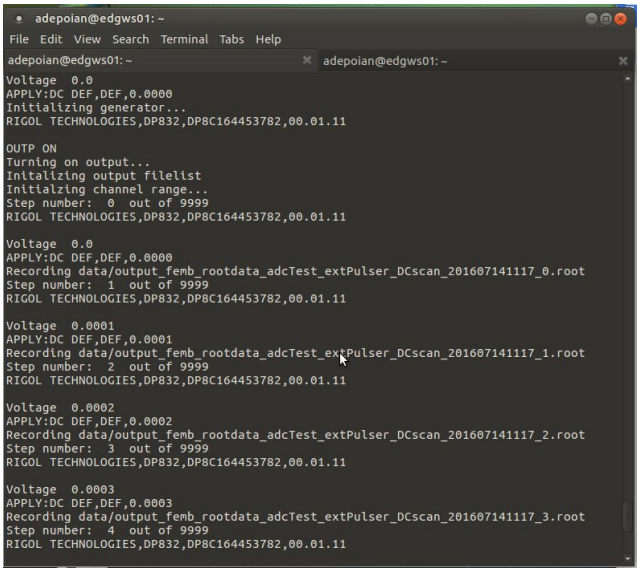
5. Another window will open called "*ADC test log*".

6. After this you will need to look at the "*Config Window"* and click the button that says "*Init Board*". This will initialize the board with the correct configuration.

7. An additional window called "*View Output*" will pop up and tell you what configuration you picked and show the output after configuring the board. This output can be seen on the above page.

8. The "*ADC test log"* window will allow the tester to input the chip's serial number, their name, and it autofills the date and time. After this, the user can click "*Start Test*".

9. This will open another window with a button labeled "*Do ADC Test*". When the user clicks this button is runs the script "*doAdcTest_extPulser_DCscan.py*". The output will print to the terminal window in real time. An example of what the output will look like is shown to the right.



10. Click "X" on the "*Do ADC Test*" window to close the GUI.

11. Check that the "*femb_wfdata"* folder in the ROOT output files contains an array of ADC samples called "wf".

Exercise

Goal: with the data for input voltages from 0.2V to 1.0V from the ADC Pulser Test, you can analyze the ROOT output files to make a simple linearity measurement and calculate mV to ADC.

We want to develop a python script that finds the mean ADC value of the waveform for each input voltage, and plots ADC count as a function of mV; it should then do a linear fit, the slope of which calculates mV to ADC. Then that python script should be called at the end of "*doAdcTest_extPulser_DCscan.py*" and the graph and fit should be displayed.